

Ch 8: Energy, Enzymes, and Metabolism

1. Which of the following statements about ATP are FALSE:

- a) One person uses about 1 kg ATP per day
- b) ATP is the "energy currency" of all cells
- c) Formation of ATP from ADP and P_i requires an input of energy
- d) ATP provides energy for many different biochemical reactions
- e) ATP molecules are used as building blocks for synthesis of some macromolecules

2. Sketch the structure of ATP, and mark the energy-rich bond that is broken by hydrolysis to release energy.

3. What is an enzyme? What is the role of enzymes in cells?

4. What is the "active site" of an enzyme?

5. What is "induced fit"? Give an example of an enzyme catalysed reaction involving induced fit

6. What is a cofactor? Give examples of cofactors.

7. What is a coenzyme? Give examples of coenzymes

8. Name different ways in which enzymes can be regulated

9. Allosteric proteins:

a) What are the characteristics of allosteric proteins?

b) Explain how enzymes are regulated by allosteric effectors

10. What is meant by "feedback inhibition"?

11. Do allosteric enzymes follow the curve for enzyme activity that is shown in Fig. 8.13? Explain.

12. What is a prosthetic group? Give some examples.

13.

a) What do the letters ATP stand for?

b) What is the function of ATP in the cell?

c) Write a reaction involving ATP as 1) substrate 2) product (formulae not required)

14. Can addition of a specific enzyme to a chemical mixture...

1) ...cause an endergonic reaction to run?

2) ...cause a spontaneous reaction to run faster?

15. What is the difference between reversible and irreversible inhibition?

16. Explain what is meant by a) anabolism, b) catabolism, c) metabolism

17. How is it possible for an endergonic reaction to take place in a cell?

Opagve 18. Describe briefly why pH is always critical for enzyme catalysed reactions

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ΔG for reaction $A \rightarrow B$ is $+11.4 \text{ kJmol}^{-1}$

ΔG for reaction $B \rightarrow C$ is -22.9 kJmol^{-1}

What is ΔG for conversion of $A \rightarrow C$?